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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LAVIN, CHRISTOPHER L

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/970,144

Applicant(s)

HERLEY, CORMAC E.

Examiner

Christopher L. Lavin

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 9, 10, 21 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-20, 22-29 and 31-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The applicant states that an image is divided into two image levels, an operation along these lines would require one threshold value. Using two threshold values would result in an image divided into three image levels. So when the applicant states "as a function of first and second thresholds" the examiner interprets this statement to mean that two threshold holds are set which means three image levels. However the section immediately preceding the quotation states that the image is only divided into two image levels. Therefore claim 20 contradicts itself. The examiner has taken claim 20 to mean that an image is thresholded into two levels, as this seems to be the action performed in the rest of the claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1 – 4, 6 – 8, 11 – 13, 16 – 20, 22 – 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crinon (6,285,804) in view of Steinkirchner (5,392,365).

In regards to claim 1, Crinon discloses A text document capture method for digitizing a text document segment in printed form, comprising: imparting a continuous lateral jittering between a digital imaging device and the [text document] (col. 2, lines 36 – 46; col. 5, line 28 – col. 6, line 3); obtaining multiple laterally-displaced digital images of all of the text document segment during the continuous lateral jittering and determining fractional pixel offset positions at which each image was obtained (col. 2, lines 36 – 46; col. 5, line 28 – col. 6, line 3; Figure 5); forming from the multiple laterally displaced images an enhanced resolution representation of the text document as a function of the fractional pixel offset positions (col. 5, line 28 – col. 6, line 3); and [de-blurring the enhanced resolution representation of the text document by thresholding the enhanced resolution into either one of two pixel luminance levels, representing foreground and background pixels, with the foreground pixels corresponding to text in the text document].

Crinon does not disclose the possible items that could be imaged with the method described above nor does the patent discuss post imaging processing.

Steinkirchner teaches in the paragraph starting at column 2, line 57 that a digital image of a text document is taken. In the paragraph starting at column 3, line 8 Steinkirchner discloses that, "the eight-bit image signal from scanner 10 is compared at a thresholder". Thresholding a two-tone image into two colors is a form of sharpening; sharpening is de-blurring. The two image levels would represent foreground and background.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to include the post processing procedures disclosed by Steinkirchner to a text document captured by the method disclosed by Crinon. In order for a computer to interpret a text document a high-resolution image is required. The method disclosed by Crinon provides a faster means of imaging a text document in high-resolution over a scanner. By using the post processing procedures of Steinkirchner the text is prepared for interpretation by a computer. Thus reducing the workload further for the computer.

In regards to claim 2, The method of claim 1 in which the lateral jittering between the digital imaging device and the text document is imparted in a pair of transverse directions (Crinon: Figure 5: Item 20A shows the inter-pixels have motion in two transverse directions, x and y directions.).

In regards to claim 3, The method of claim 2 in which the transverse directions are generally perpendicular to each other (Crinon: Figure 5: Item 20A the x and y directions are perpendicular to each other.).

In regards to claim 4, The method of claim 2 in which the lateral jittering is imparted simultaneously in the pair of transverse directions (Crinon: Figure 5: item 20A).

In regards to claim 6, The method of claim 1 in which the digital imaging device includes an array of optical detectors corresponding to pixels and having pixel dimensions and the jittering moves the digital imaging device by about the pixel dimensions (Crinon: col. 6, lines 58 – 60; col. 5, line 28 – col. 6, line 3; Figure 5: Motion estimates are performed to find motion on an inter-pixel level which is about the size of a pixel.).

In regards to claim 7, The method of claim 1 in which the text document segment is substantially all of the text document (By moving the CCD only at the pixel level substantially the entire text document is captured.).

In regard to claim 8, The method of claim 1 in which the forming the enhanced resolution representation of the text document includes calculating weighted sums from the multiple laterally displaced images (Crinon: col. 5, lines 28 – 59).

In regards to claim 11, Steinkirchner discloses in the paragraph starting at column 3, line 8 that after de-blurring the image is “then low pass filtered at 30, removing noise from the image and blurring (therefore widening) the edges of the characters”. This is the equivalent to a blurring filter.

In regards to claim 12, a CCD sensor is an array of optical detectors corresponding to pixels and having pixel dimensions. The blur filter shown in the rejection of claim 11 if it is to be used on a digital image would have to have a filter dimension corresponding to that of a pixel dimension.

In regards to claim 13, A text document capture system for digitizing with a digital imaging device a segment of a text document in printed form, comprising: a jittering mechanism for imparting a continuous lateral jittering between the text document and the digital imaging device while it obtains multiple laterally-displaced digital images of all of the text document segment, said lateral jittering moving through a distance being on the order of around one pixel (col. 2, lines 36 – 46; col. 5, line 28 – col. 6, line 3); a pixel offset determination system for determining fractional pixel offset positions at which each digital image was obtained (col. 2, lines 36 – 46; col. 5, line 28 – col. 6, line 3); and a processing system for forming an enhanced resolution representation of the text document segment from the multiple laterally displaced images as a function of the pixel offset positions corresponding to each digital image, and [for de-blurring the enhanced resolution representation] (col. 2, lines 36 – 46; col. 5, line 28 – col. 6, line 3).

Crinon does not disclose the possible items that could be imaged with the method described above nor does the patent discuss post imaging processing.

Steinkirchner teaches in the paragraph starting at column 2, line 57 that a digital image of a text document is taken. In the paragraph starting at column 3, line 8 Steinkirchner discloses that, “the eight-bit image signal from scanner 10 is compared at a thresholder”. Thresholding a two-tone image into two colors is a form of sharpening;

sharpening is de-blurring. The two image levels would represent foreground and background.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to include the post processing procedures disclosed by Steinkirchner to a text document captured by the system disclosed by Crinon. In order for a computer to interpret a text document a high-resolution image is required. The method disclosed by Crinon provides a faster means of imaging a text document in high-resolution over a scanner. By using the post processing procedures of Steinkirchner the text is prepared for interpretation by a computer. Thus reducing the workload further for the computer.

In regards to claim 16, The system of claim 13 in which the jittering mechanism imparts lateral jittering on the digital imaging device (Crinon: Figure 5).

In regards to claim 17, The system of claim 13 in which the digital imaging device includes an array of optical detectors corresponding pixels and having pixel dimensions and the jittering mechanism moves the digital imaging device by about the pixel dimensions (Crinon: col. 6, lines 58 – 60; col. 5, line 28 – col. 6, line 3; Figure 5: Motion estimates are performed to find motion on an inter-pixel level which is about the size of a pixel.).

In regards to claim 18, The system of claim 13 in which the text document segment is substantially all of the text document (By moving the CCD only at the pixel level substantially the entire text document is captured.).

In regards to claim 19, The system of claim 13 in which the processing system includes a computer that executes software instructions to form the enhanced resolution of the text document segment and to de-blur the enhanced resolution representation (Crinon: col. 6, lines 4 – 15: Software is used to perform to create the enhanced resolution image the same processor could be used to perform the operations disclosed by Steinkirchner.).

In regards to claim 20, as mentioned previously in the rejection of claim 13, in the paragraph starting at column 3, line 8 Steinkirchner discloses that, “the eight-bit image signal from scanner 10 is compared at a thresholder” the resulting thresholded image is a representation of the enhanced resolution representation in only two image levels.

In regards to claim 22, Steinkirchner discloses in the paragraph starting at column 3, line 8 that after de-blurring the image is “then low pass filtered at 30, removing noise from the image and blurring (therefore widening) the edges of the characters”. This is the equivalent to a blurring filter.

In regards to claim 23, a CCD sensor is an array of optical detectors corresponding to pixels and having pixel dimensions. The blur filter shown in the rejection of claim 22 if it is to be used on a digital image would have to have a filter dimension corresponding to that of a pixel dimension.

In regards to claim 25, the method of claim 1 and the system of claim 13 can be implemented with software stored on a computer-readable medium.

In regards to claim 26, the method of claim 2 can be implemented with software stored on a computer-readable medium.

In regards to claim 27, the method of claim 6 can be implemented with software stored on a computer-readable medium.

In regards to claim 28, the method of claim 8 can be implemented with software stored on a computer-readable medium.

In regards to claim 29, the method of claim 9 can be implemented with software stored on a computer-readable medium.

In regards to claim 31, the method of claim 11 can be implemented with software stored on a computer-readable medium.

In regards to claim 32, the method of claim 12 can be implemented with software stored on a computer-readable medium.

In regards to claim 33, claim 33 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 33.

6. Claims 5, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crinon as modified by Steinkirchner as applied to claims 1 and 13 above, and further in view of Matsumoto (5,801,814).

In regards to claim 5, Crinon (as modified by Steinkirchner) discloses the method of claim 1. Crinon as previously shown discloses that motion can be mechanically induced, however no further details are provided. Crinon therefore does not disclose that the jittering is cyclic. However techniques for providing mechanical motion are well known in the art. Matsumoto teaches (col. 8, lines 5 – 58) that a camera can be moved by piezoelectric elements for the purpose of increasing the resolution of an image. The motion disclosed by Matsumoto is cyclic (col. 8, lines 48 – 58).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the piezoelectric elements (as taught by Matsumoto) to instill cyclic motion in the mechanical motion of the method disclosed by Crinon (as modified by Steinkirchner). Cyclic motion by its very nature is easily repeated, thus Crinon could more accurately assure that the entire image is taken before performing resolution enhancement.

In regards to claims 14 and 15, Crinon (as modified by Steinkirchner) discloses the system of claim 13. Crinon as previously shown discloses that motion can be mechanically induced, however no further details are provided. Techniques for providing mechanical motion are well known in the art. Matsumoto teaches (col. 8, lines 5 – 58) that a camera can be moved by piezoelectric elements for the purpose of increasing the resolution of an image. The piezoelectric elements move the camera in the x and y directions, i.e., transverse directions.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the piezoelectric elements (as taught by Matsumoto) to create the mechanical motion of the method disclosed by Crinon (as modified by Steinkirchner). Piezoelectric elements are cheap and allow for an easily repeatable action. With a repeatable operation Crinon could more accurately assure that the entire image is taken before performing resolution enhancement.

7. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crinon in view of Steinkirchner as applied to claim 13 above, and further in view of Reinsch (5,083,313).

In regards to claim 24, the system disclosed by Crinon (as modified by Steinkirchner) would require some means to calibrate the jittering mechanism. However Crinon does not disclose how this calibration would be preformed.

Reinsch teaches in the paragraph starting at column 15, line 44 that a target can be used to calibrate an imaging system.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to include a calibration target to calibrate the jittering mechanism. Overtime oscillators will change characteristics slightly, so calibration will be required to keep the movement to consistant. A calibration target would make sense for a digital imaging system like the one disclosed by Crinon.

DETAILED ACTION

Response to Arguments

8. Applicant's arguments filed 03/14/05 have been fully considered but they are not persuasive.
9. Applicant's arguments with respect to claims 1 – 33 have been considered but are moot in view of the new ground(s) of rejection.
10. There still seems to be some confusion between the examiner and the applicant over the term thresholding as is seen in the 112 rejection of claim 20. The examiner has interpreted the situation where only two image levels result from thresholding as requiring only one threshold value. Thus Steinkirchner does teach thresholding by dividing the image up into two image levels, which one can label foreground and

background. If the examiner is still misinterpreting applicant's intent it is suggested the applicant more fully describe the thresholding operations in the claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. US. Pat. 5,666,160 discloses another system for increasing resolution by moving a CCD by subpixel amounts.

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher L. Lavin whose telephone number is 571-272-7392. The examiner can normally be reached on M - F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M. Mehta can be reached on (571) 272-7453. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLL



BRIAN WERNER
PRIMARY EXAMINER